

Introduction

Congratulations on your purchase of the 9405T back up sensor, designed to aid operation when backing up your vehicle. Simple to operate and use, the 9405T back up sensor notifies you with a series of beeps, voice announcements, and incorporates an LED display to notify you when the rear of your vehicle approaches an object or obstruction.

Before using the 9405T back up sensor, be sure to practice and test the product in order to familiarize yourself with the display, beep indicators, and detection zones as they vary by vehicle.



Warning: Improper use of the back up sensor could result in injury or death! This back up sensor is strictly a drive assist device. It is not a substitute of driver's responsibilities when backing up the vehicle. Please drive carefully and follow all local and federal laws when backing up your vehicle. Directed Electronics does not guarantee or assume any liability for injuries or damage that occur while backing your vehicle. This product should not be considered a safety device for any purpose. Proper driving skills, including slowing down, using your mirrors, and having another person as a visual assist are all proper precautions to be taken in order to safely back your vehicle.

Note: Changes or modifications to this unit not expressly approved by the party responsible for compliance will void the user's authority to operate the equipment. Any change(s) to the equipment will void FCC compliance.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a par-

ticular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Features

1. Detection distance: 1~ 8.4 feet
2. Wireless from ECU to Digital Matrix LED Display
3. Self-test function activated by reverse gear
4. 3-Color matrix LED dashboard display shows the object's location
5. Anti-false alert technology
6. All weather design (water resistant)
7. Volume switch (low/medium/high)

Specifications

Operating Voltage: 9V to 16V

Display current required: less than 200mA

Buzzer: 70-90dB

Temperature: -40° to 176° F (-40° to +80° C)

What is Included

- ECU (Electronic Control Unit)
- Digital Matrix LED Display
- 4-ultrasonic sensors
- 4-ultrasonic sensor connecting cables
- 3-sheet metal screws
- 18.5mm hole saw

Tools Required

Tools Required

- Tape measure
- Electric Drill
- Digital Multi-Meter
- Wire stripper
- Electrical tape

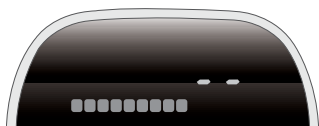
Operation

Introduction

The following illustrations show the general reaction of the backup system sensing and display

The system will first test all the sensors when the reversing gear is engaged (see *Self-Test Function*), and then the system starts sensing objects to the rear of your vehicle.

- a. The object distance is—greater than 8.5Ft:



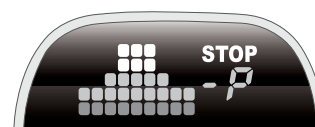
Zone 1 Green LED of display will flash.

- b. The object distance is—8.4–1Ft:



The display will show the distance by the digital number displayed and show the object's location in the Matrix LED Display.

- c. When the object distance is—less than 1Ft:



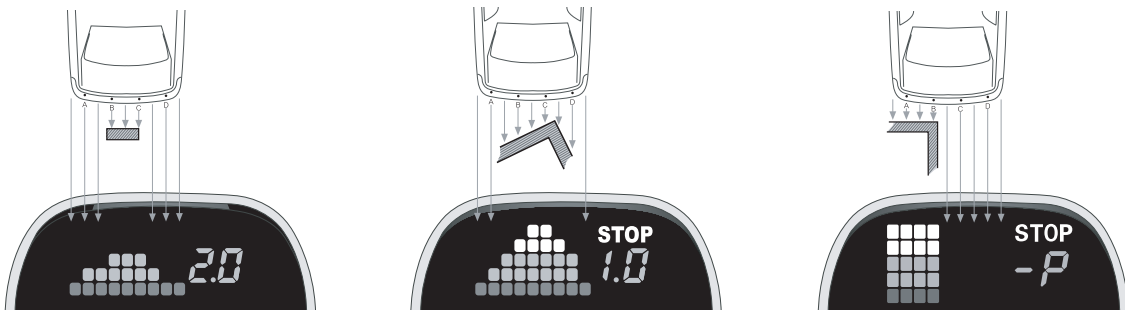
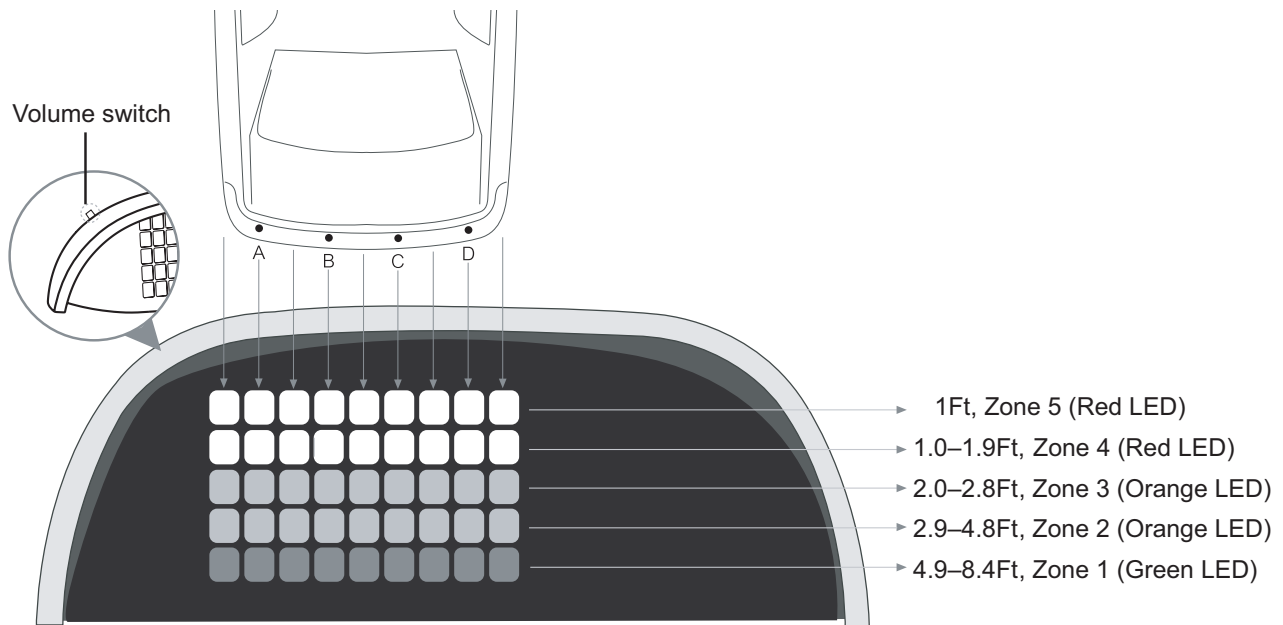
"-P" will be displayed and "Stop" will flash.

Digital Matrix LED Display

The illustrations below show the LED display when detecting different shaped objects.

The volume switch located at the top left of the display has three settings. This switch has the following options.

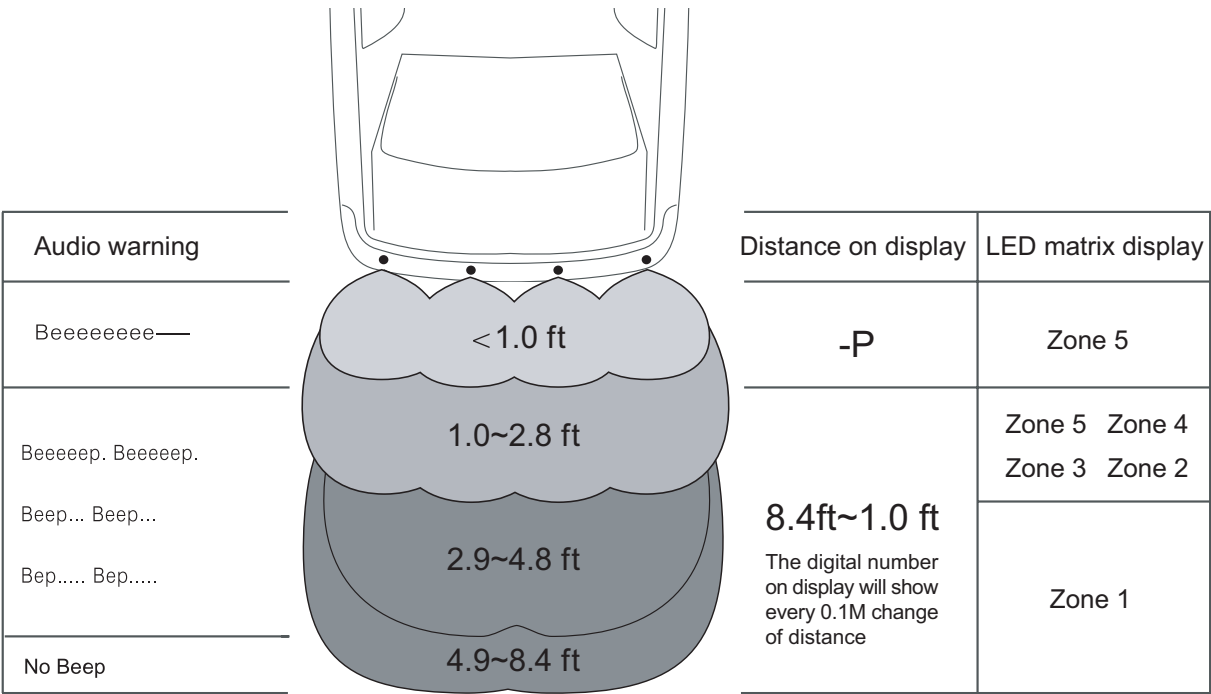
- Beeps only, low volume
- Beeps with voice, low volume
- Beeps with voice, high volume



Digital Matrix Numeric Display

As your vehicle backs up towards an object, the beep warning will first be none when the object is beyond 8.4 feet away. Then, it will start beeping at short intervals. As you get closer to the object the beeps will lengthen until it

becomes a constant tone. Stop the vehicle, you are now at less than 1 foot from the object. If the volume switch is on a voice support position, the distance and stop command will also be announced as you back up.

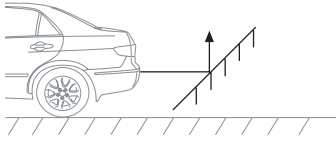


NOTE: Initially the system will beep when the vehicle is put into reverse.

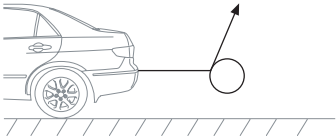
False Readings

Detection errors may occur due to the following cases:

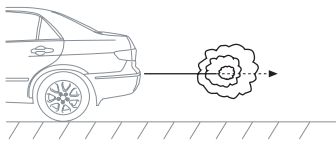
Smooth sloping surface



Smooth round object



Items absorbing sound, e.g. cotton



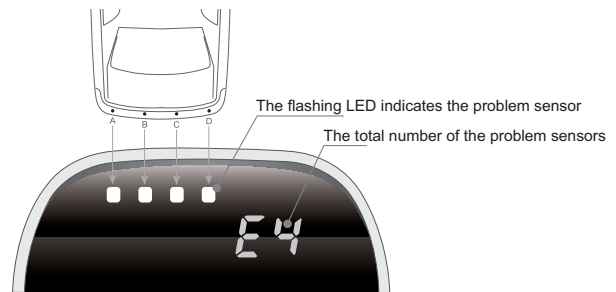
1. Heavy rain or snow, a contaminated or damaged sensor(s) could result in detection errors.
2. Check to ensure the system is in order before use.
3. Clean sensors of any mud or debris. Immediately replace any damaged sensor when detected by the system.
4. Do not paint over the sensors as this will affect the systems performance and accuracy.
5. Heavy smoke or vapor from exhaust, due to a cold start or a poorly running engine can also result in a false reading.

Self-Test Function

The back-up system only activates when the vehicle is placed in reverse gear. When placed in reverse gear the system first does a diagnostic check to ensure the system is fully functional and reports any sensor malfunctions within the back-up system.

If all the sensors are normal, the system will beep once and the LED display will flash once.

If there is any malfunction with the sensors, the system will beep 3-times to indicate that one or more sensors have problems. The flashing red LED(s) will indicate which sensor(s) is malfunctioning.



Sensor A has problem (E1: 1 problem sensor)



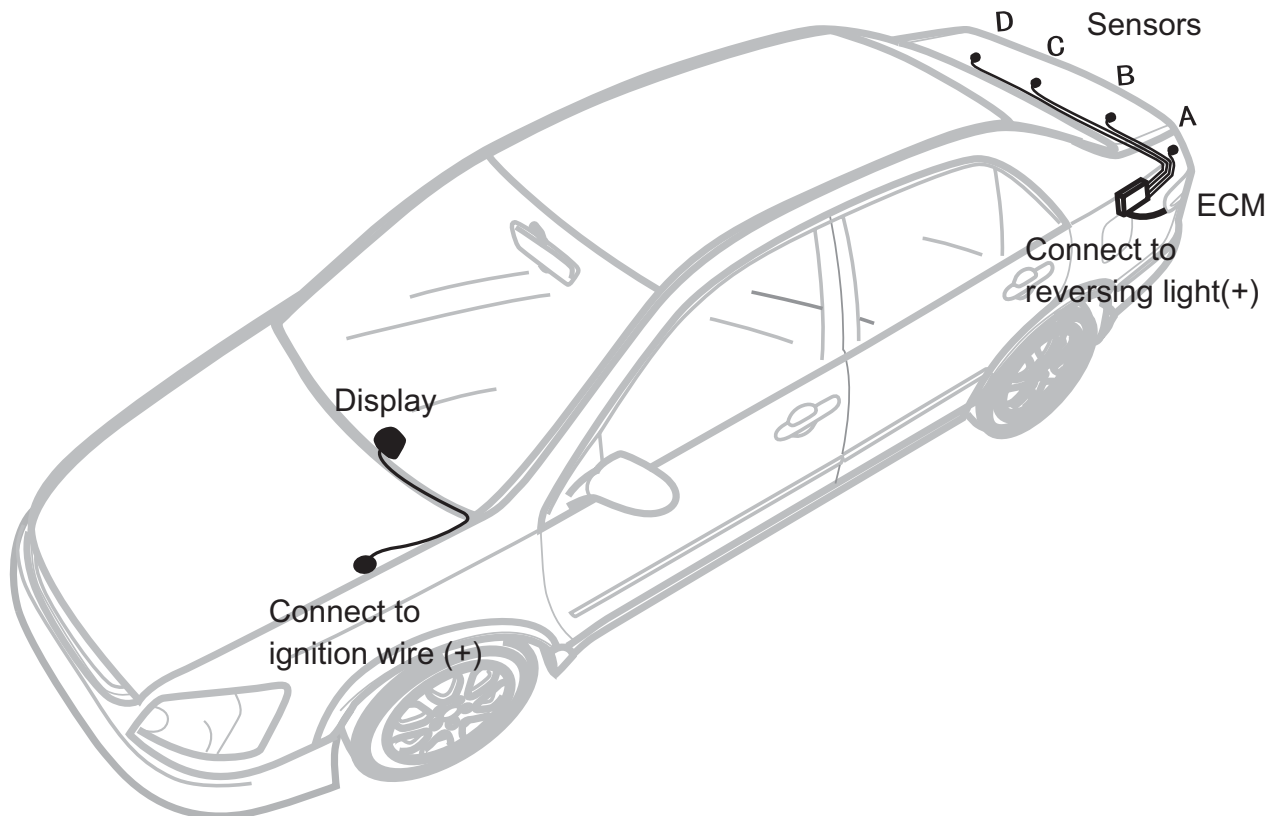
Sensor A,D have problem (E2: 2 problem sensors)

Installation

Note: Before installing system let the components of the exhaust system cool down. This will make the installation safer and preclude heat damage to the back up sensor wiring or components.

Installation Diagram

The following illustration shows the general location of the components of the back up system.

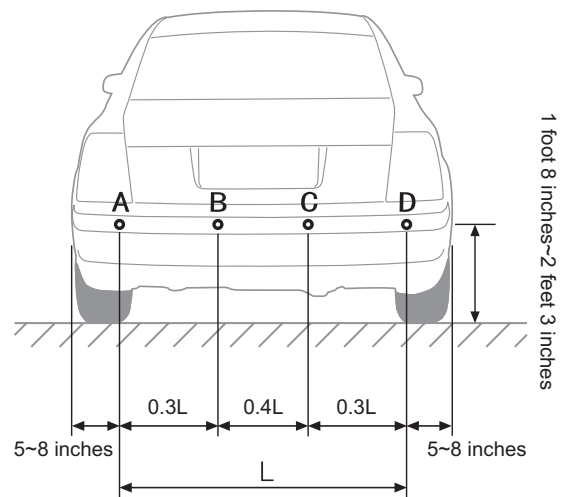


Sensor Installation

1. Verify that the size of the supplied hole saw is compatible to the diameter of the sensor before drilling your bumper. Use a scrap piece of wood for this test.

Note: Before drilling any holes in the vehicle ensure that the area behind is clear of any electrical, hydraulic, or support members, etc.

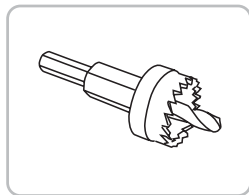
2. Install the sensor vertically, the "up" arrow must be pointing up.
3. Each sensor is numbered, ensure that they are installed as shown on the illustration.



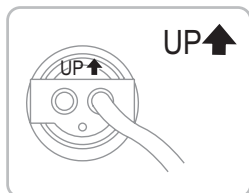
Example Sensor Placement Calculation:

1. Measure the mounting distance between the proposed locations for sensor A and sensor D. For this example (not to be used for your vehicle) let's say that measures 48".
2. Then 0.3L is $0.3 \times 48" = 14.4"$
and 0.4L is $0.4 \times 48" = 19.2"$
3. Hence, the distance that sensor B is from sensor A is 14.4 inches, and the distance that sensor C is from sensor D is 14.4 inches. The distance between sensor B and C will be 19.2".

NOTE: These distances are approximate as mounting locations have to be selected based on clearance behind the bumper and any obstructions or bumper curvatures on the surface of the bumper.



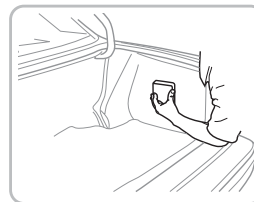
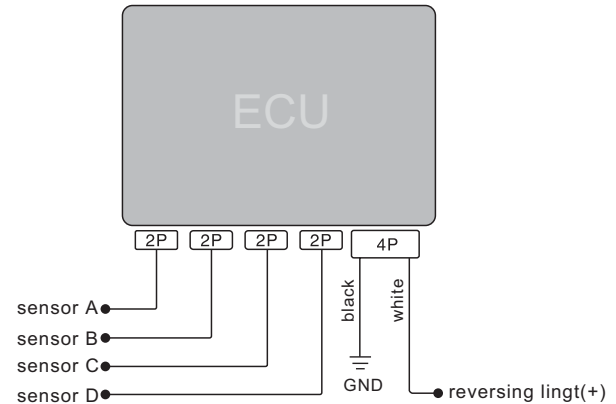
1. Verify that the size of the supplied hole saw (18.5mm) is compatible to the diameter of the sensor by first drilling a test hole in a scrap piece of wood.



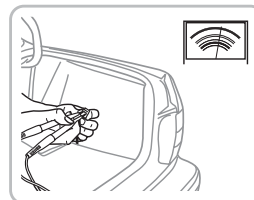
2. Install the sensor vertically, the "up" sign must be on upside.

4. Drill the holes in the bumper as indicated in the diagrams above and install the sensors. Sensors A and D should **NOT** be mounted on the curve of the bumper.

ECU Installation



Mount ECU in trunk
or
for a truck in as much
of a protected
area as possible



Connect the white wire
to reversing light(+)

Note: Before drilling any holes ensure the the area behind is clear of any electrical, hydraulic, or support members, etc.

Note: Wiring is shown and described is for a positive reverse indicator system.

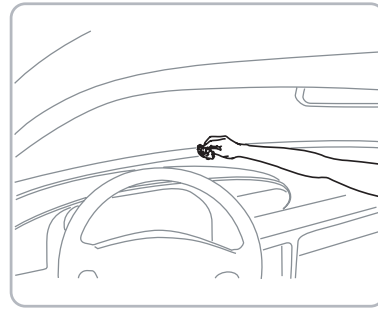
The ECU is water resistant, however, it is recommended that the module be mounted in the trunk compartment or for a truck in as much of a protected area as possible.

1. Use the 3-sheet metal screws to mount the module.
2. Connect the white wire to reversing light(+)

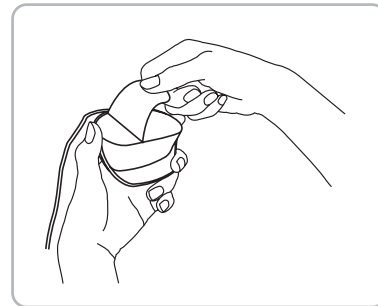
Sensor to ECU cabling

1. Each of the four sensor interconnecting cables are numbered to match with the number on the sensor cable.
2. To ensure a water resistant connection at the sensors, the connectors should be seated so that the O-ring on the connector is snug against the collar of the jack before tightening the connector.
3. Run the sensor interconnecting cables up into the trunk (or to the location of the ECU for a truck) and connect to the ECU module. Ensure that you connect the correct numbered sensor lead to match the connector jack on the ECU module (see illustration).
4. Connect the White wire to the reverse indicator wire (refer to previous illustration).
5. Connect the Black wire to the vehicle's chassis (refer to previous illustration).

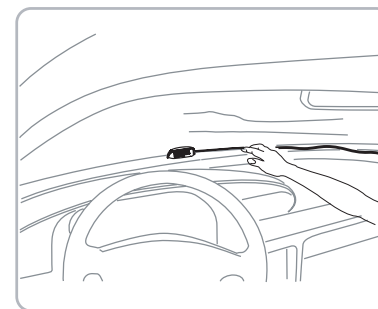
3. Clean the area of the dashboard where the display is going to be mounted.



4. Remove the 3M sticker off the bottom of the display.

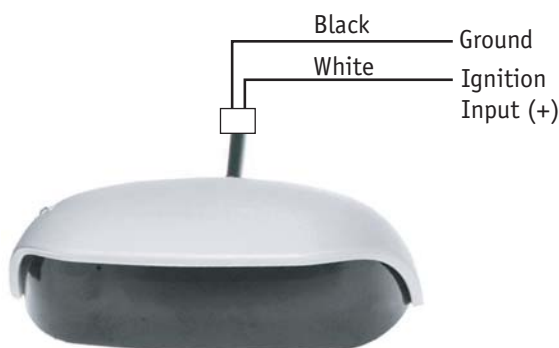


5. Mount the display on the dashboard by firmly pressing down on the display.



Digital Matrix LED Display

Note: Discuss with the vehicle owner the placement of the display.



1. Connect the White wire to the (+) ignition wire.
2. Connect the Black wire to the vehicle's chassis.

After Installation Test

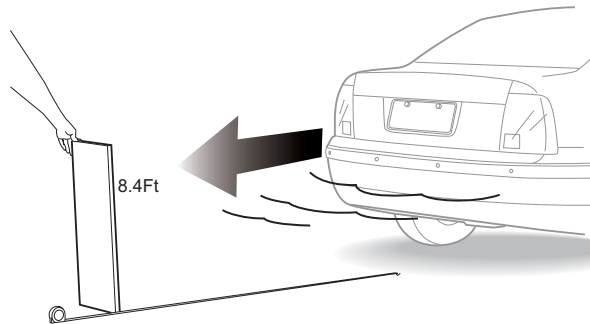
Use the following illustration to test and verify the operation of the backup system.



Warning: Do not stand behind a moving vehicle death or injury could occur. Prior to testing, set the parking brake On, ignition key On (not start), step foot on brake and shift the vehicle into reverse.

Ensure that the engine is not running while proceeding with the following tests.

Test the system operation with a piece of wood (8 inches wide x 3 feet, 3 inches high) after the installation. Start with the wood more than 8.4 feet away from the vehicle. Then move the wood closer to the vehicle and ensure that both the audible, LED, and distance indicators display correctly.



Troubleshooting

No beep at power up or no LEDs flashing

1. Is power wire connected to ECU correctly?
2. Verify (+)12V at ECU when vehicle is in reverse.
3. Verify the ground connection
4. Have you connected to the correct reversing indicator wire?
5. Do you have a minimum of (+)12V and ground at the display?

False warning tone or false LED flashing

1. Is the sensor mounted too low or pointing to the ground?

Sensors do not detect any objects

1. Is the vehicle's exhaust smoking? Correct or allow it to clear before proceeding with testing.

2. Are sensors properly plugged into the correct sockets?

If the problem persists, please follow these steps:

1. For consumers: Contact your dealer
2. For Installer or dealer:
 - a. Replace the ECU and re-check the system.
 - b. Test the sensors with a known operative ECU and retest using the flat wooden board.
 - c. Plug the known operative sensors into the ECU and re-check.
 - d. Contact Directed tech support.